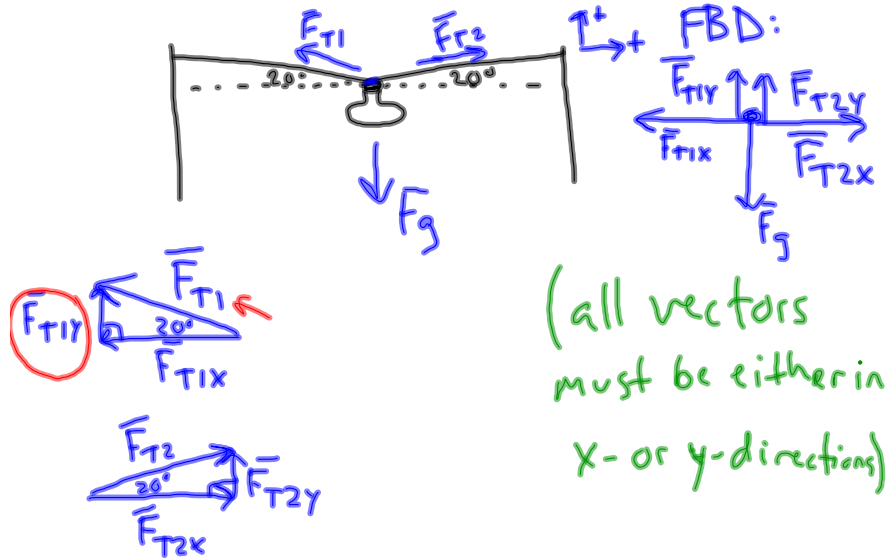


Force Practice Problem 1st Block 9.16.11

A light bulb is suspended at the halfway point from a wire that is connected between two walls. The wire sags, and as it does it makes an angle of 20 degrees with the horizontal. If the mass of the light bulb is 5 kg, what is the tension on the wire?



$$\sum \bar{F}_x = 0$$

$$-F_{T1x} + F_{T2x} = 0$$

$$F_{T1x} = F_{T2x}$$

Because light bulb is halfway, $F_{T1y} = F_{T2y}$

$$\sin(20^\circ) = \frac{F_{T1y}}{F_{T1}}$$

$$F_{T1} = \frac{F_{T1y}}{\sin(20^\circ)}$$

$$= \frac{24.5 \text{ N}}{\sin(20^\circ)}$$

$$= 71.6 \text{ N}$$

$$\sum \bar{F}_y = 0$$

$$+F_{T1y} + F_{T2y} - F_g = 0$$

$$F_{T1y} + F_{T2y} = F_g$$

$$F_{T1y} + F_{T1y} = m a_g$$

$$2F_{T1y} = m a_g$$

$$F_{T1y} = \frac{m a_g}{2}$$

$$= \frac{(5 \text{ kg})(9.8 \text{ m/s}^2)}{2}$$

$$= 24.5 \text{ N}$$